

ABSTRACT

A two-dimensional photonic crystal coupler is disclosed, together with a cross-coupled laser structure that is based on a two-dimensional photonic crystal coupler stage. Unlike traditional grating couplers, this two-dimensional photonic crystal coupler can couple light into a single or a plurality of discrete directions in the far-field, *i.e.*, the output light may be unidirectional or discrete. The coupler can be integrated with one-dimensional lasers, a distributed feedback laser, a distributed Bragg reflector laser, and integrated on the same waveguide as the lasers. A resonant cavity coupler design improves the coupling efficiency of two-dimensional photonic crystal-based couplers.